Claims

1. A catalyst for hydrocarbon steam cracking, which comprises $KMgPO_4$ as a catalyst component.

2. The catalyst of claim 1, which is a supported catalyst in which $KMgPO_4$ is supported on a carrier.

3. The catalyst of claim 2, wherein the carrier is selected from the group consisting of alpha-alumina, silica, silica-alumina, zirconium oxide, magnesium oxide, magnesium aluminate, calcium aluminate, and zeolite.

4. The catalyst of claim 2, wherein a content of $KMgPO_4$ in the supported catalyst is in a range of 0.5-30 wt%, based on the total weight of the supported catalyst.

5. The catalyst of claim 2, wherein $KMgPO_4$ is derived from a $KMgPO_4$ precursor prepared from magnesium nitrate hydrate, potassium hydroxide, and ammonium phosphate.

6. A method for preparing a catalyst for hydrocarbon steam cracking, which comprises:

dissolving a $KMgPO_4$ precursor in water to prepare an aqueous solution of the $KMgPO_4$ precursor; and

impregnating a carrier with the aqueous solution of the

$KMgPO_4$ precursor to prepare a supported catalyst.

7. The method of claim 6, further comprising sintering the supported catalyst.

8. The method of claim 7, wherein the sintering is carried out at 1,000-1,400℃ for 22-26 hours.

9. The method of claim 6, wherein the $KMgPO_4$ precursor is prepared from magnesium nitrate hydrate, potassium hydroxide, and ammonium phosphate.

10. The method of claim 6, wherein the carrier is selected from the group consisting of alpha-alumina, silica, silica-alumina, zirconium oxide, magnesium oxide, magnesium aluminate, calcium aluminate, and zeolite.

11. The catalyst of claim 1, which is a sintered catalyst obtained by sintering a $KMgPO_4$ powder or a $KMgPO_4$ precursor powder and metal oxide.

12. The catalyst of claim 11, wherein a content of $KMgPO_4$ in the sintered catalyst is in a range of 0.5-50 wt%, based on the total weight of the sintered catalyst.

13. The catalyst of claim 11, wherein the metal oxide is selected from the group consisting of alpha-alumina, silica, silica-alumina, zirconium oxide, magnesium oxide, magnesium aluminate, calcium aluminate, and zeolite.

14. The catalyst of claim 11, wherein the $KMgPO_4$ precursor is prepared from magnesium nitrate hydrate, potassium hydroxide, and ammonium phosphate.

15. A method for preparing a catalyst for hydrocarbon steam cracking, which comprises:

mixing a $KMgPO_4$ powder or a $KMgPO_4$ precursor powder and metal oxide; and

sintering the resultant mixture to obtain a sintered catalyst of $KMgPO_4$-metal oxide.

16. The method of claim 15, wherein the sintering is carried out at 1,000-1,400℃ for 22-26 hours.

17. The method of claim 15, wherein the metal oxide is selected from the group consisting of alpha-alumina, silica, silica-alumina, zirconium oxide, magnesium oxide, magnesium aluminate, calcium aluminate, and zeolite.

18. A method for producing olefins by steam cracking of

hydrocarbons in the presence of the catalyst selected from the group consisting of a catalyst comprising $KMgSO_4$ as a catalytic component, a supported catalyst and a sintered catalyst.

19. The method of claim 18, wherein the steam cracking is carried out at a reaction temperature of 600-1,000℃, a weight ratio of steam/hydrocarbons of 0.3-1.0, and LHSV (Liquid Hourly Space Velocity) of 1-20 hr^{-1}.

20. The method of claim 18, wherein the steam cracking is carried out in a reactor selected from the group consisting of a fixed-bed reactor, a fluidized-bed reactor, and a mobile phase reactor.

21. The method of claim 18, wherein the catalyst is regenerated by removal of cokes formed on a surface of the catalyst at 500-1,300℃ in the presence of air, steam, or a mixture thereof after the steam cracking.